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## SOME PRELIMINARY STATISTICS OF THE FLORA OF SOUTHERN FLORIDA<sup>1</sup>

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We have been working towards the completion of a concise, descriptive manual of the vascular plants of southern Florida for approximately the past four years. Our interest in this work stems from the fact that this part of Florida, unique botanically in the continental United States because of its indigenous tropical flora, does not have an adequate, modern, taxonomic treatment for its plants. The area has not been covered in whole or in part by a manual since Small's *Flora of Miami* (1913a), *Flora of the Florida Keys* (1913b), and *Manual of the Flora of Southeastern U. S.* (1933). It has been our aim to produce a new manual in the shortest possible time; publication cannot be delayed for an indefinite period to allow for detailed, lengthy research that is required to provide solutions for all the taxonomic problems that arise in preparation. A preliminary checklist was published earlier (Lakela and Craighead, 1965) that served as a point of departure for our field and

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herbarium work. Since that time we have placed the revised names and records on "key sort" punch cards; this report is based largely on the statistics derived from an analysis of the flora using this method.

There has been considerable interest in the plant ecology of southern Florida, and many of these studies included lists of plants for the area. Millspaugh's *Flora of the Sand Keys* (1907) is a detailed ecological and floristic survey of the small islands lying west of Key West. Harshberger (1914) described 16 "formations" of plants and included species' lists in an ecological survey of southern Florida which he defined as the whole of Manatee, De Sota, Lee, Palm Beach, Dade, parts of Osceola, St. Lucie, and Monroe counties, Harper (1927) described southern Florida as that portion of the State extending from the Florida Keys north to Manatee Co. on the west coast, and to Indian River Co. on the east coast, an area of about 17,000 square miles. He listed 430 species for this area. In another ecological survey Davis (1943) limited southern Florida to Charlotte Co., the southern halves of Highland and Okeechobee Cos., St. Lucie Co. and the area south with a total of about 13,000 square miles. He classified the vegetation into 7 main types of communities: high pine forest and scrub, pine flatwoods rockland pine forest and saw palmetto, hammock forests, inland swamps cypress forests and bay tree forests, mangrove swamps and salt marshes, freshwater marshes and wet prairies, and coastal beach and dune vegetation. He identified 850 species of vascular plants including 90 species of trees, 125 species of small trees and shrubs, 130 species of grasses, and 90 species of sedges and rushes. Other noteworthy ecological studies of southern Florida that have species' lists are Phillips (1940), Kurz (1942), Egler (1950), Laessle (1958), and Alexander (1955, 1959).

We have limited our manual range to the southernmost counties in Florida, Collier, Dade, and Monroe, an area of approximately 5000 square miles, because of the general floristic correlations of this part of the State. DeWolf (1964) has estimated that the number of species ought to

be from 400-2000, mostly around 1000 in an area of this size and at this latitude. Our preliminary results show that the total number of species of vascular plants is 1,596. We expect this number to change slightly with revisionary study now in progress. Herbaceous species are 1,032 (about 65% of the total flora), woody species are 564 (about 35%) of the total. From a taxonomic standpoint, the flora is predominately an herbaceous one. The general distribution of taxa is as follows:

	Families	Genera	Species
Pteridophytes	11	36	74
Gymnosperms	4	4	7
Angiosperms	155	556	1515
monocots	29	165	538
dicots	126	391	977
totals	170	596	1596

The largest family in numbers of species and varieties is the Poaceae with 194. Next in size is Asteraceae with 153, Fabaceae with 134, Orchidaceae with 70, Cyperaceae with 62, Euphorbiaceae with 61, Rubiaceae with 40, and Malvaceae with 32.

The relative size and floristic diversity of the vegetation of southern Florida can be noted when one compares these results with the statistics of other floras. Small listed 146 families, 522 genera and 878 species of seed plants in his Flora of Miami (1913a) and 233 families, 1518 genera, and 5557 species of seed plants for the Southeastern States (1933). Comparisons with Small's numbers are not too meaningful since he recognized a number of segregate species, genera, and families that are not generally accepted today. Erdtman West, long-time student of the flora of Florida, estimated the total number of vascular species for the State to be about 3,000 (*in litt.*), an estimate considerably higher than that of Moldenke (1944). Fernald (1950) has 168 families, 1,133 genera, and 5,523 species of vascular plants for Central and Northeastern U. S. and Canada. Leon and Alain (1962) tabulated 181 families, 1,296 genera, and 5,785 species of seed plants for

the Cuban flora with about 50% of the species endemic. D'Arcy (1967) listed 349 genera and 550 species of Dicotyledons for the small island of Tortola, Virgin Islands. Dickson (1953) has 102 families and 415 species on 25 of the Lower Florida Keys, certainly a large number for so small an area. Ward's checklist (1968) listed 318 genera and 1,183 species of lower vascular plants, Gymnosperms, and Monocots for Florida.

#### ORIGIN OF THE FLORA

The flora is composed of a tropical element and a non-tropical or temperate element. There are 970 species (about 61%) that are generally tropical in distribution, and 626 (about 39%) that are primarily nontropical in origin or distribution. The flora is predominately tropical, and the most significant contribution has come from the Antillean area of tropical America (Howard, 1954); 880 of the 970 species (about 91%) are also found in the West Indies. Of the 1,032 herbs 539 (about 52%) are West Indian or Caribbean in distribution. The woody flora has an even higher percentage of tropical species with 77% of the trees, shrubs, and woody vines of southern Florida being tropical in distribution. The shrubs in particular are predominately Antillean in origin: 250 of 329 species are tropical, and 182 are West Indian species. Most of the 626 non-tropical species are also found in continental United States, and their distribution apparently extends into southern Florida.

The identification and relationships of the endemic flora of Florida has been of concern to botanists for a number of years, and the problems are still largely unresolved (James, 1961). Howard (1954) accepted 385 species of Angiosperms as endemic to Florida. The total number of species and varieties apparently endemic to peninsular Florida that occur in southern Florida is 160, or about 10% of the flora; 139 (87%) are dicots, and 60% of the dicots are herbaceous. We believe this number of endemics is much too high, and our revisionary study has already

reduced this number by demonstrating that some of Small's "endemic" species are in reality West Indian taxa. It is probable that less than 5% of the flora is truly endemic. This ought not to be surprising when one considers that southern Florida is geologically very young even in comparison with other areas in peninsular Florida such as the Lake Wales Ridge that has been continually available to plants since the Pliocene or earlier.

#### PLANT ASSOCIATIONS

We have been concerned with the plant ecology of the manual range. Particular attention has been given to the identification and the floristic composition of the important plant associations or communities. We have identified 13 principal associations chiefly by means of the local habitat. The numbers of species that may be found in these associations is as follows: scrub vegetation, 76; hardwood hammocks, 306; freshwater swamps, 188; dry pineland, 303; seasonally wet pineland, 361 (floristically the richest association); mangrove, 13; salt marsh, 23; wet prairies, 172; dry prairies, 69; coastal strand, 115; ruderal or disturbed areas, 250; aquatic and marshland, 191; and, marine waters, 5. Many of the species are ecotypically diverse and they can be found in more than one kind of habitat. Additional, fairly well-defined plant communities can be segregated from the major ones listed here by refinements in the classification.

One of the truly difficult problems we have had to deal with in the preparation of this flora is the identification of those species introduced into southern Florida mostly as ornamentals or useful plants that have become established outside of cultivation. If reasonable evidence is available that indicates the plant has escaped and is spreading apparently into new areas, we have included the species as part of the total flora along with the indigenous plants. The introduced and naturalized flora is approximately 250 species, or about 16% of the flora.

We are including chromosome numbers with species'

descriptions where a count has been reported. Chromosome numbers are known for 229 species in the manual range (about 14% of the flora); 190 of these are herbaceous species. Most of the chromosome counts have not been obtained from materials collected in southern Florida, but rather are based on plants of other parts of the species' ranges.

#### SUMMARY

Good (1964, p 32) places southern Florida in the "Neotropical Kingdom", Caribbean Region together with the West Indies, Bahamas, and Bermudas in his classification of the world's floristic regions. Our preliminary statistics confirm that the flora is predominately a tropical one having close taxonomic relationships with the Antillean area. However, there are significantly more herbaceous species than woody ones. Ecologically, the richest plant associations are the wet or dry pinelands and the tropical hardwood hammocks. The former have high proportions of non-tropical or temperate species, the latter are predominately West Indian in origin.

One of the important by-products of the preparation of a flora treatment such as this has been the identification of a large number of taxonomic problems that merit bio-systematic investigation. It is our hope that a new manual of the flora will not only stimulate interest in plants of the area, but also will point out to botanists problems of all kinds for further research in southern Florida.

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